

## EM324 MATH REVIEW

NAME \_\_\_\_\_ Section \_\_\_\_\_

(1) Given the functions

$$\Phi = x^2y + 2xz \quad \vec{A} = xy\hat{i} + y^2\hat{j} + 2\hat{k} \quad \vec{B} = x^2\hat{i} - xy\hat{j} + z\hat{k}$$

Find: (a)  $\vec{A} \cdot \vec{B}$

(b)  $\vec{A} \times \vec{B}$

(c)  $\frac{\partial \vec{A}}{\partial x}$

(d)  $\nabla \cdot \vec{A}$

(e)  $\nabla \times \vec{B}$

(f)  $\nabla \Phi$

(g) find the unit vector normal to the surface  $\Phi = 4$  @ (2, -2, 3).

(h) find the equation  $f(x,y,z)$  of the plane tangent to the surface  $\Phi = 4$  @ (2, -2, 3).

2. (a) Integrate  $\frac{dp}{dz} = -\frac{gp}{RT}$  for  $T = T_a - \beta z$ .

(b) Show that  $\frac{g}{R\beta}$  is dimensionless.